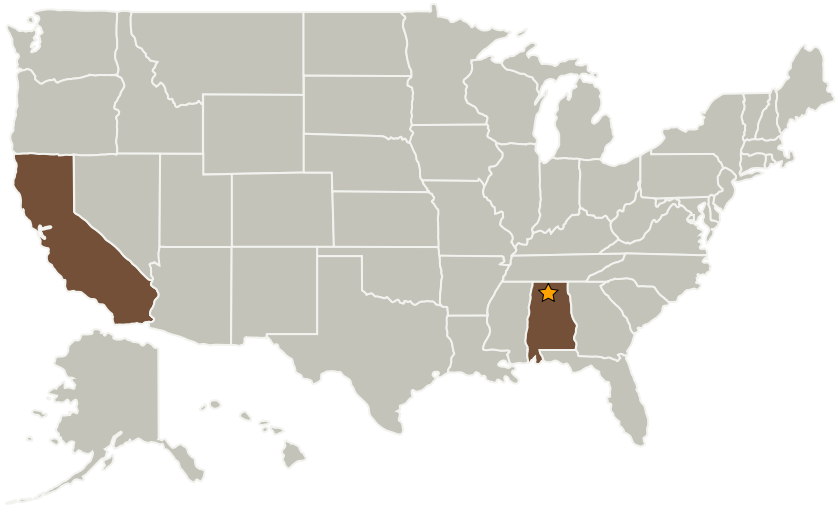
Intelligence-Based Multi-Resolution 3D Visual Modeling, Registration And Obstacle Avoidance Capabilities For Unmanned Vehicles, Phase II

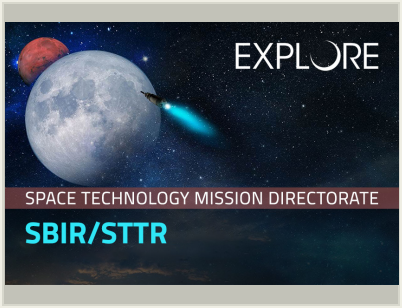
Completed Technology Project (2005 - 2007)

Project Introduction

As one of NASA's key motivation, the use of truly autonomous unmanned vehicles (UV) has been hampered by lack of sophisticated and resource efficient obstacle avoidance systems. Solving the obstacle avoidance problem to permit truly autonomous operations in a cluttered and occluded environment has been the subject of considerable research. In Phase I, UtopiaCompression (UC) has developed a layered, intelligent and adaptive system concept that will facilitate UV operations by solving the collision avoidance and path planning problems using inexpensive imaging sensors and modest computational resources. In Phase II, UC shall fully implement this concept. UC's focus is to push the limits of automation in the 3D arena by providing a real-time, end-to-end solution that includes: (i) deriving 3D structures (computing depth) from overlapping (stereo pair) images or video sequence acquired from sensors aboard autonomous agents; (ii) using the derived 3D structure to compute and model a spatio-temporal vector field; and (iii) based on the distance to the moving/stationary objects, plan a navigation strategy that commands the agent to cruise along a safe path from a source to a destination, avoiding the stationary/moving obstacles in the frontal hemisphere. UC's proposed technology provides immediate benefits to NASA and Non-NASA commercial applications.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
UtopiaCompression Corporation	Supporting Organization	Industry	Los Angeles, California

Primary U.S. Work Locations	
Alabama	California

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  - TX02.1 Avionics Component Technologies
    - TX02.1.3 High Performance Processors